

WHAT IS CLAIMED IS

1. A packet transmission system comprising:  
a plurality of wireless base stations; and  
5 one or more terminal devices belonging to one of  
the wireless base stations;  
wherein each of the wireless base stations has a  
location table describing each of the terminal devices  
associated with a corresponding wireless base station to  
10 which the terminal device currently belongs, and is  
configured to exchange the information in the location  
table with the other wireless base stations to update  
the location table and to forward a received packet to a  
next hop along a transmission route toward a destination  
15 terminal device.

2. The packet transmission system of claim 1, wherein  
each of the wireless base stations is configured to  
20 broadcast a message reporting participation of a new  
terminal device when the new terminal device belongs to  
said wireless base station; and  
wherein upon receiving the message, the other base  
stations update the location tables.

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3. The packet transmission system of claim 1, wherein  
each of the wireless base stations further has:  
a route control table describing each of the other  
30 wireless base stations in the network in association  
with the next hop to which the received packet is to be  
forwarded if a source terminal device or a destination  
terminal device currently belongs to one of the wireless

base stations.

4. The packet transmission system of claim 3, wherein  
5 each of the wireless stations is configured to, upon  
receiving the packet, search the location table to  
determine a wireless base station to which the source  
terminal device or the destination terminal device  
currently belongs, based on a source address or a  
10 destination address contained in the received packet,  
and to forward the received packet to the next hop  
according to the route control table.
- 15 5. The packet transmission system of claim 3, wherein  
the received packet contains ID information representing  
a transmission route used to transmit said received  
packet or address information representing a wireless  
base station to which the source terminal device or the  
20 destination terminal device currently belongs; and  
wherein each of the wireless base stations is  
configured to determine the next hop to which the  
received packet is to be forwarded from the route  
control table based on the ID information of the  
25 transmission route or the address information of the  
wireless base station contained in the packet.
6. A wireless base station constituting, together with  
30 other wireless base stations, a packet transmission  
system using a wireless packet network, comprising:  
a location table describing each of terminal  
devices currently participating in the network

associated with a corresponding one of the wireless base stations to which said terminal device currently belongs;

5 a route control table describing information items about transmission routes used in the packet transmission system, each information item being associated with one of the other wireless base stations assuming that said one of the other wireless base stations is related to a source or a destination;

10 a packet receiving unit configured to receive a packet;

a route determination unit configured to determine a route used to transmit the received packet based on information contained in the received packet; and

15 a packet transmission unit configured to transmit the packet to a next hop according to the route control table.

20 7. The wireless base station of claim 6, wherein the route determination unit identifies a terminal device indicated by a source address or a destination address contained in the received packet, determines a wireless base station to which the identified terminal device currently belongs with reference to the location table, and finds the next hop in the route control table.

30 8. The wireless base station of claim 6, wherein the packet transmission unit broadcasts a message packet reporting participation of a new terminal device when the new terminal device belongs to the wireless base station.

9. The wireless base station of claim 6, wherein when the receiving unit receives a message packet reporting a new terminal device having belonged to one of the other wireless base stations, the route determination unit updates the location table.

10. The wireless base station of claim 6, wherein when the receiving unit receives a packet from a source terminal device belonging to this wireless base station, the packet transmission unit writes an address of a destination side wireless base station to which a destination terminal device currently belongs in the packet, and then transmits the packet to the next hop according to the route control table.

11. A packet transmission system comprising:  
a plurality of wireless base stations and one or more wireless terminal devices belonging to one of the wireless base stations;

wherein the system employs a plurality of transmission trees, each of the wireless base stations having a tree table for recording the root stations in association with ID information about the transmission trees, and

wherein when receiving a packet, each of the wireless base stations determines the transmission tree to be used for the packet transmission, and transmits the packet to another of the wireless base stations designated as a next node along the determined

transmission tree.

12. The system of claim 11, wherein each of the wireless  
5 base stations has a location table for recording said  
one or more wireless terminal devices in association  
with the corresponding wireless base station, and  
wherein when receiving the packet, each of the  
wireless base stations identifies the wireless base  
10 station corresponding to a source terminal device or a  
destination terminal device, based on a source address  
or a destination address contained in the received  
packet, determines the transmission tree extending from  
the identified wireless base station as the root station,  
15 and transmits the packet to the next node along the  
determined transmission tree.

13. The system of claim 12, wherein when a new wireless  
20 terminal device is connected to one of the wireless base  
stations, said one of the wireless base stations  
broadcasts a message packet for reporting the connection  
of the new wireless terminal device to the other  
wireless base stations along the transmission tree, and  
25 each of the other wireless base stations updates the  
location table when receiving the message packet.

14. The system of claim 11, wherein the packet contains  
30 the ID information of the transmission tree currently  
being used for the packet transmission or address  
information of the root station, and wherein when  
receiving the packet, each of the wireless base stations

determines the currently used transmission tree based on the ID information or the address information contained in the packet.

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15. The system of claim 11, wherein the transmission trees are created based on a link cost reflecting wireless channel conditions.

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16. A wireless base station used in a wireless packet transmission network, comprising:

15 a tree table configured to record information about a plurality of transmission trees used in the wireless packet transmission network, in association with corresponding root information;

a packet receiving unit configured to receive a packet;

20 a tree determination unit configured to select one of the transmission trees to be used for packet transmission, based on the information contained in the received packet; and

25 a packet transmitting unit configured to transmit the packet to a next node along the selected transmission tree, referring to the tree table.

17. The wireless base station of claim 16, further comprising:

30 a location table configured to record a wireless terminal device currently located under one of wireless base stations in the wireless packet transmission network, in association with the corresponding wireless

base station;

wherein the tree determination unit determines the wireless terminal device indicated by a source address or a destination address contained in the received packet, determines the corresponding wireless base station to which the wireless terminal device currently belongs from the location table, and determines the transmission tree extending from the determined wireless base station as the root information.

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18. The wireless base station of claim 17, wherein a new wireless terminal device is connected to this wireless base station, and the packet transmitting unit broadcasts a message packet reporting the connection of the new wireless terminal device along the transmission tree.

20 19. The wireless base station of claim 16, further comprising:

a packet checking unit configured to extract transmission tree ID information or the root information from the received packet;

25 wherein the tree determination unit determines the transmission tree to be used for the packet transmission based on the extracted information.

30 20. The wireless base station of claim 19, wherein when the wireless base station receives a packet from a wireless terminal device currently located under this wireless base station, the packet transmitting unit adds



ID information about the transmission tree extending from the wireless base station itself as the root information into the packet, and transmits the packet along the transmission tree.

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21. The wireless base station of claims 16, further comprising:

10 a cost table configured to list a link cost reflecting a wireless channel condition;

wherein the packet transmitting unit transmits a first tree creation packet when creating the transmission tree extending from this wireless base station as the root information, and

15 wherein when the packet receiving unit receives a second tree creation packet from another wireless base station in the wireless packet transmission network, the transmitting unit adds the link cost estimated at the wireless base station to the second tree creation packet,  
20 based on the cost table, and transmits the second tree creation packet.

22. A packet transmission method used in a wireless packet transmission network including a plurality of wireless base stations and one or more wireless terminal devices located under one of the wireless base stations, comprising the steps of:

25 creating two or more transmission trees, each tree extending from one of the wireless base stations as a root station;

30 providing an information pair of each of the transmission trees and the corresponding root base



stations to each of the wireless base stations;

when receiving a packet at any of the wireless base stations, determining the transmission tree to be used for transmission of the received packet; and

5 transmitting the packet to a next node along the determined transmission tree.

23. A wireless base station used in a wireless  
10 communications network, comprising:

a transmitting and receiving unit configured to transmit and receive a packet;

a packet size determination unit configured to determine a size of the received packet; and

15 a plurality of transmission trees employed based on different criteria about packet size, each transmission tree describing destination information in association with a packet transmission route; wherein

20 the transmitting and receiving unit transmits the received packet to a next node, referring to one of the transmission trees based on the packet size.

24. The wireless base station of claim 23, wherein the  
25 transmission trees include:

short packet routing means for describing the destination information in association with the packet transmission route for a short packet with the packet size at or below a prescribed reference value, and

30 long packet routing means for describing the destination information in association with the packet transmission route for a long packet with the packet size exceeding the prescribed reference value;

wherein the transmitting and receiving unit transmits the received packet to the next node, referring to either the short packet routing means or the long packet routing means.

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25. The wireless base station of claim 23, further comprising:

10 a cost estimation unit configured to calculate a link cost taking a transmission rate of a channel into account, for each of the packet size criteria.

26. The wireless base station of claim 25, wherein a cost  
15 estimation request packet is received, the cost estimation unit calculates the link cost for the channel between a previous node and the wireless base station for each of the packet size criteria, and adds the calculation results in the cost estimation request  
20 packet,

and wherein the transmitting and receiving unit transmits the cost estimation request packet with the added calculation results to adjacent nodes.

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27. A packet transmission route optimizing method in a wireless network including a plurality of wireless base stations, comprising the steps of:

30 setting a plurality of transmission trees created under different criteria about packet size, each table recording destination information in association with a transmission route;

when receiving a packet at one of the wireless base

stations, determining the packet size; and  
transmitting the packet to a next node according to  
one of the transmission trees selected based on the  
determined packet size.

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28. The packet transmission route optimizing method of  
claim 27, further comprising the steps of:

when receiving a cost estimation request packet at  
10 one of the wireless base stations, calculating a link  
cost between a previous node and said one of the  
wireless base stations, taking a transmission rate into  
account, for each of the packet size criteria;

adding the calculation results to the cost  
15 estimation request packet and transmitting the cost  
estimation request packet to adjacent wireless base  
stations;

selecting a route to a destination with the lowest  
link cost for each of the packet size criteria; and

20 updating each of the transmission trees based on  
the selected routes at each of the wireless base  
stations.

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